Watershed: **Stanislaus River**

Years Sampled: **2008, 2010, 2013-2014**

Study Objectives:

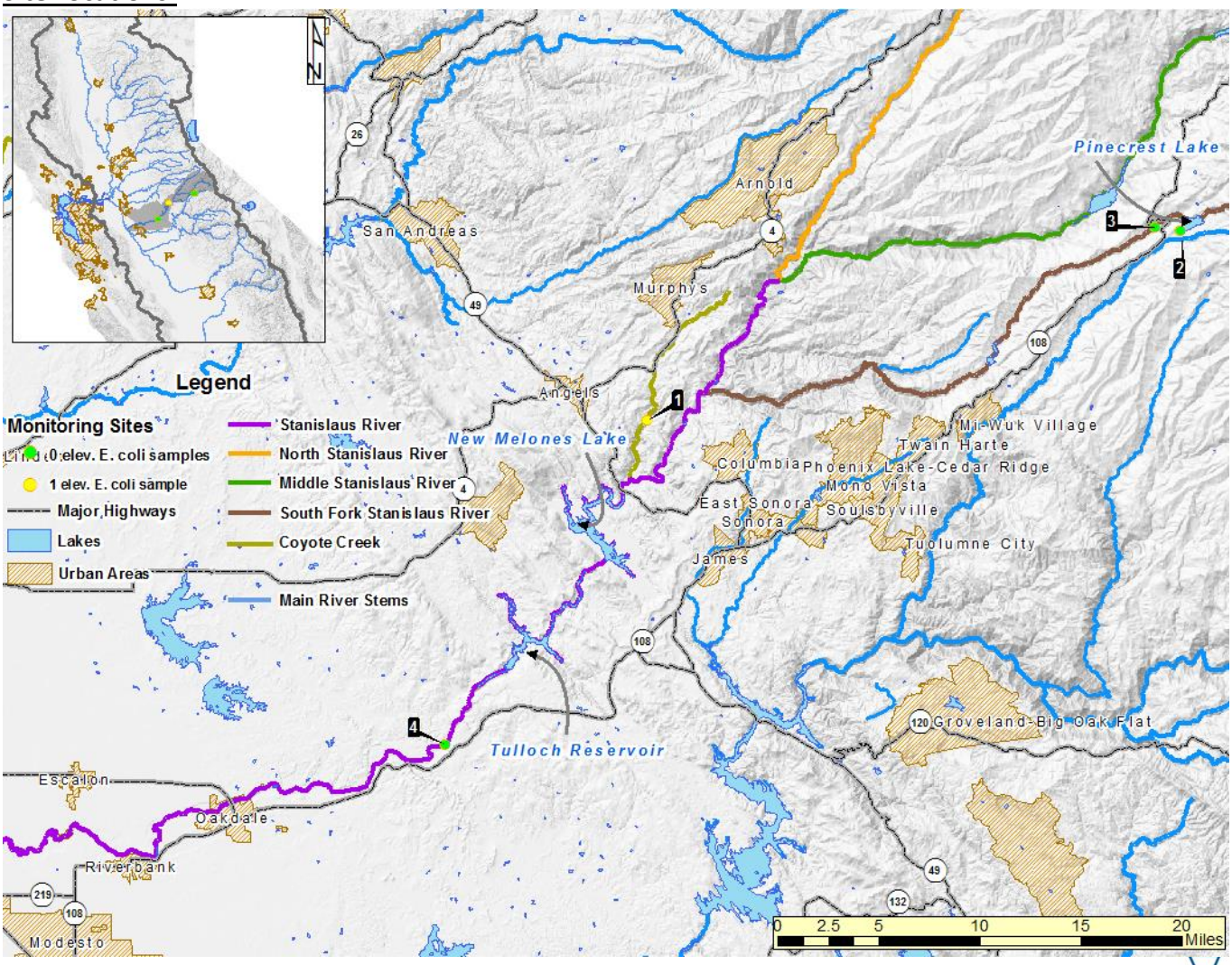
1. Is there any evidence that beneficial uses are being impacted, and if so, what are potential contributors?
2. Are there any noticeable regional, seasonal or trends observed in the water quality data?
3. What are pathogen concentrations at selected monitoring sites?

KEY STATISTICS

Number of sites sampled	**4**
Sampled by	**Water Board Staff (Sac)**
Number of sites sampled for pathogens	**0**
Number of total samples	**50**
Sampling Frequency	**2x/mo. (May-Sept.)**
Assessment Threshold	**320 MPN/100 mL**

Message: **One of fifty samples collected has had elevated *E.coli.* Three sites never exceeded the assessment threshold.**

Site Locations:



Summary of Results:

Table 1: Field Measurements

Station Code	Map #	Station Name	Oxygen, Dissolved (mg/L)		pH		SpConductivity (uS/cm)		Temperatiure (˚C)		Turbidity (NTU)	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
534CYCANB	1	Coyote Creek Natural Bridges	6.60	10.13	7.43	8.20	442.0	561.0	15.46	19.08	0.19	2.93
534TUO202	2	Pinecrest Lake near Lakeshore Drive	7.19	9.10	7.23	8.94	11.9	129.0	14.73	25.17	0.65	274.00
534TUO203	3	Stanislaus River, S Fork at Strawberry	8.50	9.53	7.21	7.80	13.8	19.1	9.83	25.92	0.43	3.57
535STC201	4	Stanislaus River at Knight's Ferry	11.97	11.97	7.32	8.26	53.0	59.0	13.93	14.23	0.50	0.53

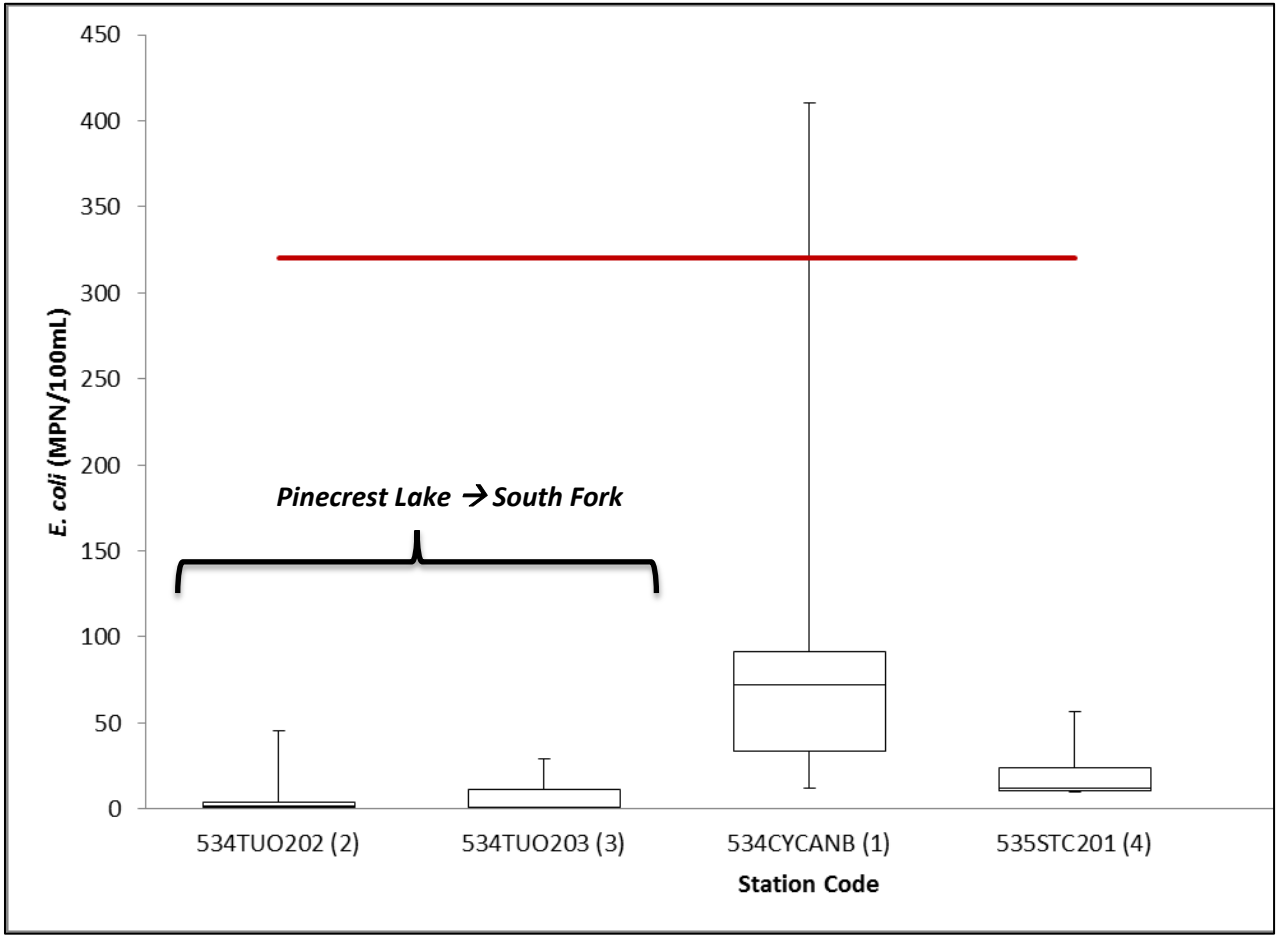
Table 2: *E. coli* and Pathogen Results

Map #	*E. coli* (MPN/100ml)					*Cryptosporidium* (cysts/L)			*Giardia* (oocysts/L)			*Salmonella* (MPN/100mL)			*E.Coli* O157:H7 (Presence/Absence)		
	Mean	Min	Max	Count	>320	Max Result	Count	(+)	Max Result	Count	(+)	Max Result	Count	(+)	Result	Count	(+)
1	93.4	12.2	410.6	18	1	NA	0	0	NA	0	0	NA	0	0	NA	0	0
2	5.6	<1.0	45.5	19	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
3	6.9	<1.0	29.2	9	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
4	22.7	9.7	56.5	4	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0

E.coli - Highlighted Cells: Exceeds EPA Guidline of 320 MPN/100ml

Pathogens - (+): positive result, Highlighted Cells: positive results, NA: Not Applicable

Graph 1: *E Coli* Results



2,3 = progressive DS flow from Pinecrest Lake (2) to South Fork (3)

WHAT IS THE MEASURE SHOWING?

The Stanislaus River flows along a relatively narrow ~100 mile course, feeding into New Melones Lake, Tulloch Reservoir, and the San Joaquin River a few miles northwest of Modesto. Comprising its headwaters are its North, Middle, and South Forks; the South Fork has been dammed at Pinecrest Lake, which serves recreational and hydroelectric purposes. Also contributing to the Stanislaus River is Coyote Creek, which runs parallel to and joins with the main stem at New Melones Lake. The sites located in the Stanislaus watershed spread from Escalon to the Stanislaus National Forest. Field measurements for each site are shown in Table 1.

Results show that only 1 of 50 samples exhibited elevated levels of *E. coli*; it was located along Coyote Creek at Natural Bridges (1) with a value of 410.6 MPN/100 mL (shown in Table 2). The percentage of contamination at the above sample locations is 2.0%; at the site specifically, this percentage is 5.6%. There were no detections at any of the other sites (shown in Graph 1).

The watershed is primarily forest (Jin et al., 2013), yet potential non-point and urban sources are abundant. It is heavily utilized for recreational activities, and is home to numerous waterfowl and other wildlife. In addition, the increasing drought may be a contributing factor for contamination as the waters become more concentrated. Further study is needed to identify specific sources.

No sites in the Stanislaus River watershed were sampled for pathogens.

WHY THIS INFORMATION IS IMPORTANT?

In 2012, the USEPA amended recreational water quality guidelines for human health under the Clean Water Act, specifying the standard threshold value (STV) for the indicator bacteria *E. coli* as 320 colony-forming units (CFU) per 100 milliliters (mL). The STV represents the 90% percentile of the water quality distribution, beyond which the water body is not recommended for recreation (Nappier & Tracy, 2012).

E. coli is an indicator of potential fecal contamination and risk of illness for those exposed to water (e.g. when swimming). Since *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern, the data collected from this study provide more information on pathogen indicators as well as specific water-borne pathogen concentrations to better assess their impact on the beneficial use of recreation and to identify potential contributors by sub watershed.

WHAT FACTORS INFLUENCE THE MEASURE?

E. coli and specific water-borne pathogens can come from human or animal waste and may be highly mobile and variable in flowing streams. In addition to human recreational use, the presence of pathogens in water may be the result of cattle grazing, wildlife, urban and agricultural runoff, or sewage spills. The physical condition of the watershed may also influence pathogen measurements, however in this study field measurements (temperature, SC, DO, turbidity and pH) were variable between sites and it is unclear if these constituents had an effect on the *E. coli* or pathogen measurements.

TECHNICAL CONSIDERATIONS:

- Data available at: CEDEN
- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Public reports and fact sheets are available at: http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/swamp_regionwide_activities/index.shtml

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Stanislaus River [Map]. 1:350000. RB5S GIS Data [computer files]. Rancho Cordova, CA. c2014 – [cited January 2015]. Using: ArcGIS [GIS software]. Version 10.2. Redlands, CA: ESRI Inc., 2013.

Jin, S., Yang, L., Danielson, P., Homer, C., Fry, J., and Xian, G. A Comprehensive change detection method for updating the National Land Cover Database to circa 2011. Multi-Resolution Land Characteristics Consortium [Internet]. c2013 – [cited January 2015]. Available from: http://www.mrlc.gov/nlcd2011.php

Nappier, Sharon, Tracy Bone. 2012 Recreational Water Quality Criteria. Environmental Protection Agency [Internet]. Sacramento, CA. c2012 – [cited January 2015]. Available from: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/factsheet2012.pdf